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ABSTRACTS

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Studies on Enzyme Action in Digestive Canal I.

Saliva of Human and Horse.

(pp. 865～871)

By T. MATSUOKA.

(From Tokyo Agricultural College, Japan; Received July 12, 1937.)

SUMMARY.

1. According to the experimental result, it is an evident fact that human saliva contains very large amount of amylase.

2. Amylase activity of human saliva corresponds to that of $\frac{1}{22}$ of commercial Kyokuhō Diastase.

3. There is a little difference on activity of Human saliva by the day collected.

4. Sex or year has little effect on the activity of amylase of human saliva.

5. It is found that horse saliva has very slight amount of amylase.

6. A certain organ acts as accelerator on amylase of horse saliva.

Studies on Enzyme Action in Digestive Canal II.

Saliva of Animals.

(pp. 872～874)

By T. MATSUOKA.

(Tokyo Agricultural College, Japan; Received July 14, 1937.)

SUMMARY.

1. By the experimental result, it is clear that cattle saliva contains very slight amount of amylase.

2. Pig saliva has also little amount of amylase.
3. Dog and cat saliva contains fairly amount of amylase.
4. Guinea pig and rat saliva contains also large amount of amylase.
5. Goat saliva resembles to sheep saliva in character; they have very slight of amylase.

"On Thermostable Amylase".

(pp. 875~878)

By Toyosaku MINAGAWA.
(Agricultural Chemical Laboratory, Tokyo Imperial University; Received July 16, 1937.)

Studies on the Utilisation and the Digestion of the Carbohydrates Contained in Mulberry Leaves by Silkworms. (Part III.)

The Influences on Growth and the Products of Silkworms fed on Mulberry Leaves to which Cane Sugar is added in different Proportions.

(pp. 879~888)

By K. KATO, S. MIWA and S. NEGI.
(At the Sericultural Experiment Institute of Gifu Prefecture; Received July 12, 1937.)

We investigated on the influences on growth and the products of silkworms by feeding mulberry leaves in different stages of growth to which are added cane sugar in different proportion in order to solving the biochemical meaning of the carbohydrate by silkworms and mulberry leave nature.

THE RESULTS ARE AS FOLLOWS.

1) The body weight, health of silkworms, cocoon and raw silk weight are increased by feeding on young leaves (in young leaves the content of HCl soluble carbohydrate, reducing sugar and cane sugar are very little) cane sugar added moderately (to weight of leaves 1~2% cane sugar are added) and decreased by feeding on young leaves which cane sugar added excess, or older leaves cane sugar added (in old leaves the content of these carbohydrate are larger than that of young gleaves).

2) The sericin N solubility of cocoon silk is increased by feeding on young or old leaves moderately (1～2%) cane sugar added and decreased by feeding sugar excess. The ratio of fibroin and sericine is increased proportionally to the content of cane sugar which added, in spite of the growth stage of mulberry leaves.

3) Though dennier of silk is not so influenced by feeding leaves cane sugar added, but, on older leaves dennier has tendency of decrease following to the increase of cane sugar.

Studies on the Utilisation and the Digestion of the Carbohydrates Contained in Mulberry Leaves by Silkworms. (Part IV.)

The Influence on the Digestion of the Chemical Component of Mulberry Leaves by Silkworms and the Composition of Silkworm Body fed on Mulberry leaves to which Cane sugar is added in different Proportion.

(pp. 889～897)

By K. Kato, S. Miwa and S. Negi.

(At the Sericultural Experiment Institute of Gifu Prefecture; Received July 12, 1937.)

In previous paper we reported the results of studing on the influence on the growth and the products of silkworms by feeding mulberry leaves added cane sugar in different proportion and that various in fluences are resulted from it.

As it is most necessary of solving by what reason these influences are arised, we studied from the biochemical point of view. In this paper we shall report the results of the influence on the digestion of the chemical components in mulberry leaves by silkworms and the chemical composition of silkworm body fed in Mulberry leaves which cane sugar added in different proportion.

The results are as follows.

1) The digestion of the dry matter is remarkably increased proportionally to cane sugar added. This increase is chiefly as the result of increase of cane sugar digestion and not the result of increase of dry matter digestion of mulberry leaves itself.

2) The digestion of raw protein is increased by feeding moderately cane sugar added to young leaves, but decreased by feeding excess cane sugar

added or old leaves sugar added.

3) Additional cane sugar is almost digested (about 90%).

4) The digestion of raw fat and ash are increased by feeding moderately cane sugar added, and decreased by feeding excess cane sugar added.

5) The chemical composition of silkworms body are influenced greatly, and water content per weight of living thing is reduced reversibly to the quantity of the additional cane sugar.

This is resulted from the content of silkworm body is remarkably concentrated by fat and glycogen which produced from eated cane sugar.

6) The raw protein content of silkworm are increased by feeding moderate cane sugar added and decreased by feeding excess sugar added.

7) The raw fat and glycogen content are increased by feeding leaves cane sugar added, because of these are converted from sugar.

8) At the relation between digestive quantity of raw protein, ratio of protein content of body and digestive quantity, and the weight of silk gland we considered as follows; Moderate cane sugar addition increases digestive quantity of the raw protein, ratio of protein content of body and digestive quantities and at last increase silk.

But excess cane sugar addition decreases silk and silk gland if the ratio of protein content of body and digestive quantites is increased for the decrease of digestive quantities.

Comparison of the Qualities of three Groups of the Cocoons that Were Spun by Silkworms Fed a Varying Number of Times, i.e. (a) 20, (b) 25, (c) 30.

(pp. 898～904)

By Toshio NAKAHAMA and Shunichi NISHIMURA.

(Laboratory of Kanebo Silk Factory, Hikone, Shiga; Received July 16, 1937)

Considering such physical qualities of the silk layer of the cocoons as largeness, thickness, weight and whiteness, the (c) group fed most often, was the best, but by "biuret reaction" experiment it was proved that as for spinning off, the inverse was true; that is, that the (a) group, fed least often, was the best.

As the result of analysis of silk layer of the cocoons, sericin A and B were greater in quantity in the (c) group than in the (a) group.

The (b) group was medium throughout.

On the Contents of 0.2NHCl Soluble Phosphoric Acid of Tyôsen Soils. (II)

(pp. 905~915)

By Dr. Misu-Hideo.
(Chemical Department, Agricultural Experiment Station of Government General of Tyôsen;
Received July 9, 1937.)

The Investigation of Glutamic Acid Preparation. (Part I~IV.)

(pp. 916~953)

By Bunzo Rokusho, Rihichi Tanaka and Hiroshi Saito.
(Received July 12, 1937.)

Preliminary experiment

The relation between the concentration of acid, time of decomposition and the rate of hydrolysis of Soyalex (Soy bean flake extracted with ethyl alcohol) was studied in examining total nitrogen and amino nitrogen in the hydrolysate.

When hydrolysed under normal pressure (108~109°C) in the following condition; Soyalex 150 g, HCl 500 cc, conc. of HCl 15~30%, time of decomposition 10~20 h, the max. amount of total nitrogen in the filtrate is obtained in the case of 15% HCl, 20 h, and the max. amount of amino nitrogen is in the case of 19% HCl, 17.5 h. When under pressure (130°C), Soyalex 50 g, HCl 200 cc, conc. of HCl 10~30%, 6~15 h, the max. amount of total nitrogen in the filtrate is obtained in the case of 10% HCl, 12 h, and the max. amount of amino nitrogen is 20%, 15 h. In both cases the max. points of total nitrogen and amino nitrogen do not coincide. To obtain the max. point of amino nitrogen, more advanced decomposition is required than the max. point of total nitrogen.

The presence of hulls in the Soyalex retard the decomposition of protein as shown in the following table.

The time of hydrolysis 10~20 h.

% of HCl used	$\frac{\text{Amino nitrogen}}{\text{Total nitrogen}} \times 100$ in the filtrate		
	Hulls removed	Hulls not removed	diff.
17	68.26~71.58	48.36~66.85	19.90~4.73
19	71.47~73.82	57.58~66.50	13.62~7.32
21	71.84~74 28	57.83~67.88	19.01~6.40

Preparation of Glutamic acid

The optimum condition for the preparation of glutamic acid from Soyalex has been studied. The method of preparation we adopted is as follows;

Soyalex is hydrolysed with different concentration and amount of HCl, for different period of time, then filtered, the filtrate and washings are evaporated to a syrup and HCl gas or conc. acid is added to the syrup to precipitate the hydrochloric acid salt. After stand 7 or more days at 0°, the glutamic acid hydrochloride is filtered and pressed to separate mother liquor, then dissolve in hot water decolorized with carbon and evaporated in vacuo to syrup, then neutralized with conc. soda solution slowly to about pH 3.2 to crystallize out the glutamic acid. After stand 1～2 days in a cold place the precipitate is filtered off and wash with cold water or cold saturated solution of glutamic acid to remove NaCl, NH_4Cl or other impurities and dried at 50° for 1～2 days.

The purity of glutamic acid thus obtained is about 97～99% calculated from Van Slyke amino nitrogen, and the specific rotation is $[\alpha]_D^{20} = +30.15 \sim 30.90$ in 1 mol HCl.

The rate of increase of amino nitrogen in the filtrate of hydrolysate does not parallel to the rate of increase of glutamic acid to be separated. It seems that the liberation of glutamic acid from the protein molecule is slower than other amino acids, so it is necessary to prolong the time of heating of hydrolysis or to use more acid to obtain glutamic acid in good yield.

Glutamic acid content in the crude glutamic acid hydrochloride from Soyalex is not constant according to the strength of hydrolysis. In the case of incomplete hydrolysis, ammonium nitrogen content is very rich and amino nitrogen is almost zero or very poor. The ash content is rich representing about 60% of crude glutamic acid hydrochloride. In the case of complete hydrolysis, the percentages of ash and nitrogen is as follows.

Ash 16%, total nitrogen 6.19%, ammonium nitrogen 1.03%, amino nitrogen 4.97%, glutamic acid nitrogen 2.97%. The ammonium nitrogen is 16.64% and the amino nitrogen is 80.29% of total nitrogen, and the glutamic acid nitrogen is about 60% of amino nitrogen.

Best result was obtained in decomposing Soyalex with 3 times of 22% HCl at 20 pound per sq. inch for 16 h. In this case pure glutamic acid is obtained in the yield of 6.59% of Soyalex, that is 14.11% of pure protein in the Soyalex.

In the following conditions, glutamic acid hydrochloride or glutamic acid are obtained in good yield. Between 0° and 30°, the more amount of glutamic acid is obtained in lower temperature. The time required to crystallize

Raw materials	Crude Protein Content of raw materials %	Conc. of HCl used %	The yield of glutamic acid	
			% of raw material	% of cr.-Protein of raw material
Soyalex flake	43.31	24	5.57	12.29
Soyalex flour	49.81	22	6.32	12.47
Soy bean flake (Benzen)	46.87	22	5.13	10.95
Soy bean Press Cake (round)	43.75	24	4.89	11.18
Soy bean Press Cake (plate)	42.06	22	5.06	12.03
Cotton seed Press Cake	32.94	26	4.07	12.36
Perilla Press Cake	37.56	22	4.33	11.53
Pea Nut Press Cake	42.06	24	5.30	12.60
Castor Press Cake	29.75	22	3.50	11.76

material 500 g. HCl 1500 cc. temp. 108～109°. time 16 h.

glutamic acid hydrochloride is sufficient 7 days at 0°. It is better to separate mother liquor from glutamic acid hydrochloride by the press at the pressure above 70 atms. The opt. pH in the case of neutralization of crude glutamic acid hydrochloride to set free glutamic acid with soda is 2.9～3.3.

The yield of glutamic acid from various oil cakes produced in Manchuria were compared. The best results obtained from each material are as follows;

When Soyalex flakes were extracted with 3 times of dil. HCl (0～5%), about 27～68% carbohydrate and 72～94% ash are extracted.

The amount of carbohydrate to be extracted is proportional to the concentration of acid, but the max. amount of ash is extracted by 1% HCl.

The best yield of glutamic acid is obtained when Soyalex is preliminary extracted with 0.5～2% HCl and then hydrolised with 18% HCl. The yield of glutamic acid thus obtained is a little better than no treated cases. The preliminary extraction of Soyalex with dil. HCl render the separation of glutamic acid hydrochloride from mother liquor easy.

Experiment on the Colon Group of Fishes. (II)

(pp. 954～971)

By Yutaka YASUKAWA.

(From the Department of Food Control the Government Institute from Infectious Diseases. Head of the Department: Dr. Y. Tohyama; Received June 10, 1937.)

Über die Quantitative Bestimmung von 2, 3-Butylenglykol.

(S. 972～977)

von Yukio Tomiyasu.

(Aus dem Agrikulturchemischen Institut der Kaiserlichen Kyushu-Universität;

Eingegangen am 22, 7, 1937.)

Das Verfahren beruht auf dem Prinzip der Kluyverschen qualitativen Methode.

Zur Bestimmung muss die betreffende Flüssigkeit (meistens 20 ccm) zuvor nach der jüngstens vom Verfasser beschriebenen Vorschrift durch Destillieren vom Acetoin befreit werden. Die im Destillierkölbchen zurückgebliebene Flüssigkeit wird dann mit 3 g festem Natriumacetat und einer geeigneten Brommenge am Rückflusskühler genau 3 Minuten in kochendem wasserbade erhitzt, und sogleich wird das Kölbchen 17 Minuten lang im wasser abgekühlt. Nachdem das übriggebliebene Brom mit Thiosulfat genau neutralisiert worden ist, wird dem Reaktionsgemisch 20 ccm Wasser zugesetzt, und dann wird es auf dem Drahtnetz langsam abdestilliert. Hiernach arbeitet man wie bei der Bestimmung von Acetoin. Nach Beendigung der Nickeldimethylglyoximbildung wird 20 ccm 40%iges Natriumacetat zugegeben, und über Nacht bei Zimmertemperatur stehengelassen. Dann spült man den Niederschlag auf einen gewogenen Glasfiltertiegel, wäscht mit 100 ccm kaltem Wasser und trocknet bei 110°C bis zur Konstanz. Danach meinem Experiment mit reinem 2,3-Butylenglykol —isoliert aus einer mit Bac. lactis aerogenes angestellten Zuckervergärung— die Ausbeute etwa 71% betug, muss der gefundene Wert mit 1.41 multipliziert werden:

$$\text{Gewicht des Glykols} = \text{Gewicht des Niederschlags} \times 0.624 \times 1.41$$

Auf diese Weise ist eine quantitative Bestimmung des Glykols mit ziemlich guter Genauigkeit möglich.

Bei der Oxydation muss die Brommenge sehr beachtet werden. Eine zu grosse Brommenge (z. B. 2 ccm) senkt die Ausbeute sehr merklich, insbesondere bei Abwesenheit von anderen durch Brom oxydierbaren Substanzen, z. B. Zucker, Eiweiss u. s. w. Deshalb muss man die geeignetste Menge für jede Probe zuvor bestimmen. In meinem Falle, wo Zuckerbouillon benuzt wurde, ist etwa 0.3～0.7 ccm Brom am geeignetsten.

Das Ferrisalz wirkt auf die Oxydation zwar günstig, aber es ist nicht, „unentbehrlibh“ im Gegensatz zur Angabe von Kluyver, Donker und Vissert Hooft.

Action of the Xylan-decomposing Bacteria.

(Nutritive Value of the Pentosan VIII.)

(pp. 978～988)

By Hisayoshi Iwata.

(Morioka Imperial College of Agriculture and Forestry; Received July 24, 1937.)

Very active new species of xylan-decomposing bacteria were isolated from the caeca and rumen. By these organisms, xylan was decomposed into large quantities of xylose and small quantities of lactic, acetic, formic and carbonic acids. The decomposition of xylose by these organisms was, however very weak. The optimal condition for their growth and xylan decomposing action was pH 6.8～7.4 at 37°C. This agrees with the condition of alimentary canals of higher animals. These isolated bacteria could hydrolyze not only xylan but also starch, dextrin, inulin, melezitose, raffinose, trehalose, melibiose, lactose, sucrose, maltose and salicin. These bacteria and their products were harmless to rats and mice, hence they must be useful and probably necessary for the higher animals when whose diets contain xylan.

Alcohol Manufacture from Potatoes. I. Storage of Potatoes. Part 1.

Changes during Storage.

(pp. 989～997)

By K. Sato, I. Maruta, A. Matumi and M. Murai.

(Institute of Hokkaido Industrial Experiment Station, Received July 26, 1937.)

In our experiments, the total sugar (glucose and sucrose) was found maximum during from March 23 to April 13 and then decreased rapidly, so we think that the stored potatoes, as a raw material of alcohol manufacture, should be used until the end of March or early April.

Alcohol Manufacture from Potatoes. I. Storage of Potatoes. Part 2.

Effects of Some Treatments on Sprouting.

(pp. 998～1002)

By K. Sato, I. Maruta, A. Matumi and M. Murai.
(Institute of Hokkaido Industrial Experiment Station; Received July 26, 1937.)

There was no industrial treatment on inhibiting the sprouting of potatoes, supporting the facts of preceeding report.